Spectroscopic characterization of novel push-pull thieno[3,2-*b*]thiophene derivatives functionalized with different acceptor groups

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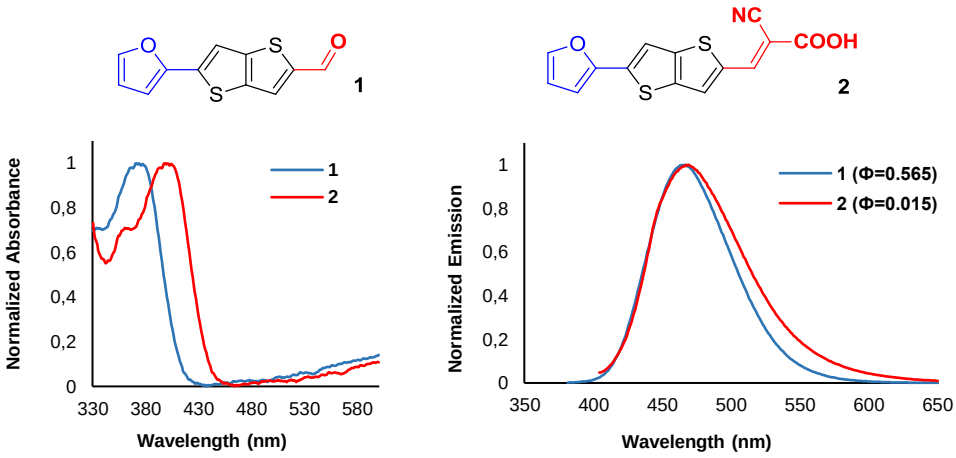
Abstract: Push-pull π-conjugated systems of the thiophene type have several interesting applications as nonlinear optical (NLO) and photochromic materials, sensitizers for dye sensitized solar cells (DSSCs), etc [1-3]. As part of an on-going research to develop efficient donor-acceptor substituted heterocyclic systems for diverse applications such as NLO and organic sensitizers for DSSCs [1], we report in this communication the synthesis and characterization of two novel heterocyclic compounds **1**-**2**, using several synthetic methodologies. These new push-pull systems are based on a furan donor moiety and a thieno[3,2-*b*]thiophene spacer, functionalized with different electron withdrawing groups. The full characterization of the new compounds was performed using UV-visible (absorption and emission), ^{1}H NMR and IR spectroscopies. The experimental results showed that the optical and electronic properties of these push-pull systems can be readily tuned by varying the electron-acceptor strength of the groups linked to the thieno[3,2-*b*]thiophene π-bridge. Moreover, their push-pull character with a significant intramolecular charge transfer (ICT) from the donor furan heterocycle to the acceptor groups and a high polarizability of the whole π-conjugated systems reveal their potential application as chromophores for NLO and/or as sensitizers for DSSCs.



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